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The Role of MSM Status, Race, and Marijuana Use in HIV Risk among Adult Males in the

Columbus, OH Region

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Abstract

Human Immunodeficiency Virus, or HIV, is a life-long illness that affects millions across the globe. Young adult males, especially men who have sex with men (MSM), are at significant risk for the virus. This project examined a hypothesized association between marijuana use and HIV infection, comorbidity of HIV and other STIs, and potentially confounding variables in a sample of men tested for HIV in Columbus, Ohio.

The sample included a total of 898 non-Hispanic/Latino males (294 White, 604 Black/African-American, non-Hispanic/Latino males aged 18 to 74 years. All were tested for HIV between February 2013 and April 2013 by Columbus (Ohio) Public Health. Mean age, mean number of current sexual partners (past 12 months), mean number of HIV risk factors, and mean number of lifetime sexually transmitted diseases (STD) were calculated and used to generate general linear models that compared means across groups based on MSM status, race, and marijuana use. On mean, Black/African-American males reported more STDs, current sexual partners, and HIV risk factors than White males. MSM had more HIV risk factors and current sexual partners on mean than heterosexual males. Marijuana users had more HIV risk factors, STDs, and current sexual partners than those who did not report marijuana use. It is recommended that MSM use protection for sexual activities and be given access to evidence-based information on the association between marijuana use and increased risk for contracting HIV.

Keywords: Public Health, Condom use, risky sexual behavior, AIDS, STDs, OraQuick
Advance

The Role of MSM Status, Race, and Marijuana Use in HIV Risk among Adult Males in the
Columbus, OH Region

Human Immunodeficiency Virus, also known as HIV, is a life-long condition that has plagued the United States since the early 1980s (Kazanjian, 2012). It is the virus that causes Acquired Immunodeficiency Syndrome (AIDS). There is currently no cure for HIV or AIDS, but antiretroviral medications are available that help to prolong life and lower the possibility of transmitting the virus to others (Centers for Disease Control and Prevention [CDC], 2014a). It is transmittable through blood, semen, vaginal secretions, and breast milk. These properties allow it to be transmitted through needle sharing, unprotected sexual contact, and from mother-to-child.

The origins of HIV are unknown, but it is thought to have originated in a type of chimpanzee in West Africa infected with Simian Immunodeficiency Virus, or SIV, which is the simian equivalent to HIV (CDC, 2014a). SIV has a close genetic relationship to HIV (Sharp & Hahn, 2011). Researchers speculate that the virus was transmitted to humans through exposure to SIV-infected blood from hunting and ingesting the meat of the chimpanzees, and that the virus then mutated (CDC, 2014a). The first human to become infected is known as “patient zero,” and it is thought that this initial infection occurred between 1900 and 1930 (Pepin, 2013, p. 475).

HIV infects immune system cells known as CD4 cells, or T-cells, and the virus depletes the body of these cells to replicate (Sharp & Hahn, 2011). If too many of the CD4 cells are destroyed, the human body becomes immunocompromised and can no longer fight off simple infections. HIV was identified in the 1980s when medical professionals diagnosed homosexual men with an unusual array of opportunistic infections (Sharp & Hahn, 2011).

The purpose of this research project was to analyze de-identified data detailing HIV test results for 898 males aged 18 to 74 years tested by Columbus (Ohio) Public Health between

February 2013 and April 2013. The data were originally collected by Columbus Public Health under informed consent. Previous analysis by Columbus Public Health included only a demographic description of individuals tested for HIV. The descriptive analysis included drug and alcohol use, condom use, previous STDs, the number of sexual partners, and partner drug and alcohol use by age groups, gender, race, sexual orientation. This hypothesis-driven project was designed to provide deeper insight into the sample associations and characteristics, especially among men who have sex with men (MSM) and marijuana users. It is hoped that this research will lead to improvements in targeted testing by identifying populations most at-risk for HIV by understanding behavioral associations. This could be used to justify more testing outreach programs and placing these programs in communities that contain these at-risk populations.

There are significant benefits to increased public health knowledge concerning HIV and drug use. Research in this area can identify regional patterns of drug use and HIV infection that may be specific to the Columbus area. This project provides more information for Columbus Public Health to use in its local prevention and testing efforts.

Literature Review

HIV Basics

Upon its emergence in the early 1980s, AIDS was thought to predominantly affect homosexual men and individuals using illegal intravenous drugs (Kazanjan, 2012). Scientists quickly discovered that AIDS was caused by a blood-borne virus that became known as HIV. The virus quickly spread across the globe and has become a pandemic that public health officials continue to battle (CDC, 2014a).

Originally, the virus was spread among communities of homosexual males and intravenous drug users (IDUs) in urban settings (Kazanjan, 2012). However, by the mid-1980s, children, blood transfusion recipients, dental patients, and other networks of individuals who did not engage in stigmatized behaviors were diagnosed with the fatal virus (Kazanjan, 2012). Today, HIV is most common among heterosexual populations across the globe (Kazanjan, 2012).

In 2012 an estimated 1.2 million Americans were living with HIV and 20% of those individuals were not aware of their infection (Patrick, O'Malley, Johnston, Terry-McElrath, & Schulenberg, 2012). Each year, 50,000 new HIV infections are reported in the United States (Patrick et al., 2012). The Ohio Department of Health reported that Franklin County, Ohio, which includes Columbus and surrounding areas, had 250 people with a new HIV diagnosis in 2012 (Ohio Department of Health, 2012). That same year, Franklin County had a population of 1,163,414 (Ohio Department of Health, 2012).

Risk Factors

Several risk factors for contracting HIV and health disparities in HIV risk have been identified by scientists and public health officials in their attempts to control its spread. Included in this list are age, race, gender, sexual orientation, greater number of sexual partners, younger age of first sexual experience, previous sexually transmitted infections, lack of or inconsistent condom use, and alcohol and/or drug use. In the United States, HIV has the highest incidence and prevalence in MSM, African Americans, and people who use or abuse illicit substances (Finlayson et al., 2011).

Researchers have identified possible explanations for the staggering number of young people infected with HIV. Youth have a low perception of risk and often consider themselves to

be invincible. Additionally, they often have low rates of condom use, high rates of STDs, and use alcohol and drugs (Hendershot, Magnan, & Bryan, 2010). Homelessness, inadequate education in prevention, and low rates of testing also contribute to high rates of infection (CDC, 2014g).

In addition to age, race is considered to be a risk factor for contracting HIV. Some racial groups have higher incidence and prevalence rates of HIV infection than others, reflecting disparities based on social determinants of health (CDC, 2014h) (see Figure 1). African Americans are disproportionately affected by HIV (CDC, 2014b): this population is the most affected by HIV and has a rate of infection in the United States (U.S.) eight times greater than white Americans (CDC, 2014h). In 2010, African Americans represented 44% of all new HIV infections in the U.S. according to the CDC (2014h), although they only represented 12% of the U.S. population. The CDC (2014d) reported that in 2010, American Indians and Alaskan Natives were responsible for less than 1% of new HIV infections. This was also true for Native Hawaiians or Pacific Islanders (CDC, 2014f). Asians only accounted for 2% of new infections in the same year (CDC, 2014h).

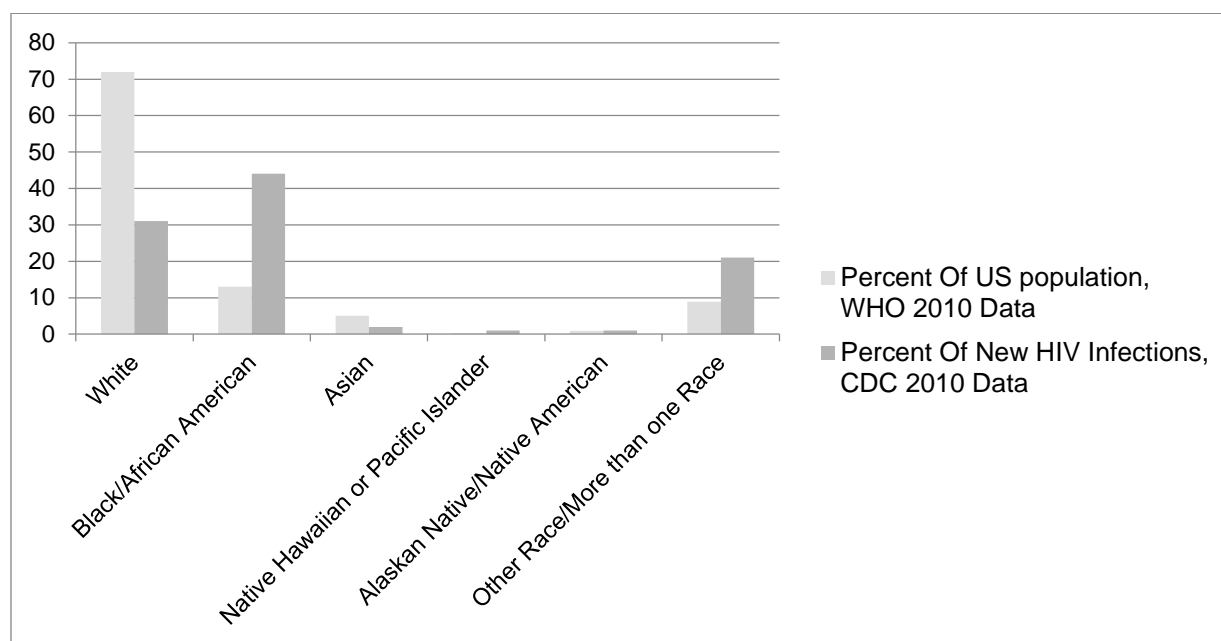


Figure 1. Percent of population and new HIV infections in the United States by race.

Gender also plays a role HIV risk. Men often engage in riskier sexual behaviors and tend to have more partners than women (Patrick et al., 2012). In 2010, 76% of new HIV infections were in men (CDC, 2014e). Within the U.S. population, MSM is a subset of males at greater risk for HIV than other males because they tend to report more sex partners when compared to other men. MSM also report riskier sexual behaviors including anal sex, which is the most common route of transmission in this population (CDC, 2014g). MSM represent less than 5% of the population in the U.S., but account for almost half of all persons living with HIV in the U.S. (Boone, Cook, & Wilson, 2013). Within the MSM population, African Americans are disproportionately affected by HIV (CDC, 2014c): according to 2010 data from the CDC, 72% of new HIV infections in African-American men were attributed to their status as MSM (CDC, 2014h). African Americans are also more likely to encounter problems associated with limited access to and use of quality health care, lower income, less education, and higher rates of unemployment and incarceration than other races (CDC, 2014h). African American MSM tend to have sexual partners of the same race: with a small population size and high prevalence of HIV, this means that African-American MSM have a greater statistical risk of exposure to HIV (CDC, 2014h).

Lower age of first sexual encounters, less frequent condom use, and multiple lifetime and concurrent sexual partners also increases the risk for HIV (Patrick et al., 2012). Those who begin having sexual experiences at earlier ages are having sexual relations over a longer part of their lifetime and are therefore potentially exposed to HIV and other STDs more often, so have a greater chance of contracting an infection. Unprotected sexual intercourse with *any* partner is a direct risk factor for HIV, and HIV is now most commonly spread through heterosexual contact

(Kazanjian, 2012). Individuals who have had multiple and concurrent sexual partners are potentially exposed more often than those who have fewer partners in a lifetime, as well as those who are in a monogamous relationship.

Previous infection with other sexually transmitted diseases (e.g. herpes, syphilis, gonorrhea, trichomoniasis, and Chlamydia) is also a risk factor for HIV infection. Sexually transmitted diseases can cause changes in genital tissue, especially among women (Schwebke, 2005) making them more vulnerable to bacterial, viral, or fungal infections. Sexually transmitted diseases often cause bacterial vaginosis that leads to changes in vaginal flora, which makes a woman more susceptible to HIV infection (Schwebke, 2005). Additionally, genital ulcers and inflammation from sexually transmitted diseases cause an increase in the amount of T-cells and CD4 cells in genital secretions: these cells are preferentially targeted by HIV (CDC, 2014a).

The use of alcohol and/or illicit drugs has long been associated with risky sexual behaviors among young adults (Collins et al., 2005). Risky sexual behaviors include alcohol, marijuana, and/or other substance use before sexual activity, inconsistent condom use, partner violence and sexual assault, and multiple sexual partners (both concurrent and lifetime) (Collins et al., 2005). Alcohol and other intoxicants cause decreased inhibitions and have the potential to lead to multiple concurrent sexual partners, multiple lifetime sexual partners, or both (Celentano et al., 2006). In addition to these risk factors, alcohol may also be a reason for decreased condom use (Patrick et al., 2012).

Marijuana Use as a Risk Factor for HIV

Marijuana is the most commonly used illicit drug in the United States (Andrade, Carroll, & Petry, 2013). Up to 42% of adults report use at some point in their life, and approximately 7% of adults report recent use (past 30 days) (Andrade et al., 2013). The use of marijuana may lead

to an early initiation of sexual activity as well as a greater number of lifetime partners and therefore, STD and HIV frequency (Brodbeck, Matter, & Moggio, 2006). Marijuana use is also associated with a decreased frequency and incidence of condom use (Hendershot et al., 2010). Simply stated, "...substance use leads to unsafe sex; unsafe sex leads to substance use" (Woody et al., 1999, p. 203).

Marijuana use also has situational consequences that can influence behaviors. For example, Lane, Cherek, Tcheremissine, Lieving, and Pietras (2005) claim that marijuana use causes aggression and impulsivity. Impulsivity is related to a greater number of sexual partners, riskier sexual behaviors, and abuse of other substances (Moore et al., 2005). Other investigators state that marijuana may also impair information processing, cause relaxation or euphoric mood, or aphrodisiac effects (Brodbeck et al., 2006). The reduced behavioral control produced by these effects may ultimately contribute to unprotected sex, a known risk factor for HIV infection. In a 2001 article, the authors state that nearly two-thirds of the marijuana users surveyed reported having unprotected sex (Flom et al., 2001).

Some groups of individuals are at greater risk for using marijuana. While there are no gender differences associated with marijuana use, men and women have different levels of sexual risk behaviors associated with their drug use (Andrade et al., 2013). Women using marijuana weekly are three times more likely to report risky sexual behavior than non-users, while men who report weekly use are two times more likely to report risky sexual behavior than non-users (Brodbeck et al., 2006). In this way, weekly marijuana use increases the likelihood of risky sexual behaviors, and users are therefore at greater risk for HIV and other STDs.

Individuals in peer groups in which marijuana use is the norm, or those under extreme psychosocial stress are more likely than their counterparts to use marijuana to 'fit in' or cope

with stress (Brodbeck et al., 2006). Daily marijuana use is higher among individuals emerging into adulthood, defined as the developmental period between the ages of 18 and 25 years (Bruce, Harper, Fernandez, & The Adolescent Medicine Trials Network for HIV AIDS Interventions, 2013). This period is characterized by identity exploration, work and residency instabilities, and the development of adult identities (Bruce et al., 2013). Emerging adults have sex more often and have more partners per year than other age categories (Collins et al., 2005). Additionally, these young people report using marijuana to enhance experiences, expand awareness, conform to social groups, or decrease social anxiety (Bruce et al., 2013).

Gay, bisexual, and lesbian teens and young adults are more likely to report marijuana use than heterosexual individuals in the same age category, for the same reasons as other young people (Bruce et al., 2013). According to the Disability-Stress-Coping Model, young people do not yet possess the mature mental or emotional resources needed to cope with the stress associated with the fears of being stigmatized for their sexual orientation (Wallander & Varni, 1998). These individuals may use or abuse alcohol and marijuana to reduce stress and cope with their sexual orientation. This is especially true for MSM: Bruce, Harper, Fernandez, and The Adolescent Medicine Trials Network for HIV AIDS Interventions (2013) report that 23% of young, urban MSM use marijuana weekly. Further, MSM are more likely to use multiple substances than heterosexual men, and use them before or during sex to enhance the experience (Boone et al., 2013).

The effects of polysubstance drug abuse should be considered a possible comorbidity associated with HIV infection, should the individual become infected with the virus and have continued to use or abuse substances. Public health departments and substance use treatment centers should implement alternatives to drug use for coping with stresses of becoming an adult

with a non-majority sexual orientation. Stress management interventions have been shown to be successful in improving self-care and health outcomes of male emerging adults (Bruce et al., 2013).

Marijuana use is also associated with decreased condom use and the purported gradual progression to more addictive illicit substances such as cocaine (powder or crack) or heroin (Andrade et al., 2013). Public health officials must educate those at risk for HIV to get tested regularly, and provide access to healthier ways to cope with the social stigma of their sexuality or HIV-positive status besides using marijuana and other illicit substances such as cocaine or heroin.

Other Drugs

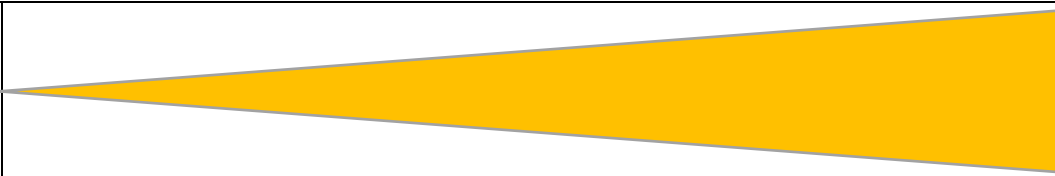
Some researchers have labeled marijuana as a “gateway drug” (Andrade et al., 2013, p. 2). In other words, the purport that using marijuana often leads to the use and abuse of other illicit substances such as cocaine, opiates, and heroin. For example, Andrade and colleagues (2013) report that marijuana users are more likely to become dependent on cocaine and opioids than non-marijuana users. Marijuana users who use/abuse other illicit substances put themselves at higher risk for HIV and other STDs. These polysubstance users usually report a larger number of sexual partners and a greater frequency of unprotected sex (Andrade et al., 2013).

In general, individuals who use drugs of any kind are at an increased risk for HIV than those who do not use drugs (Flom et al., 2001). However, Celentano and colleagues (2006) reported that different drugs are associated with different risk behaviors. For example, marijuana is associated with decreased condom use, earlier initiation of sexual activity, and a greater number of sexual partners, while cocaine is associated with unprotected sex, more frequent, repeated anal intercourse, and a decreased receptiveness to safer sex messages (Celentano et al.,

2006). Any injectable drug is a direct risk for HIV due to unsafe needle sharing practices (Patrick et al., 2012). These drugs fall into a hierarchy that the authors use to explain the level of risk associated with each substance. The hierarchy as determined by Flom and colleagues in their 2001 article is shown in Table 1. A drug farther to the right on the list indicates higher association with risky sexual behaviors.

Table 1

Drugs Ranked by their Association with Risky Sexual Behaviors

Association with sexual risk behaviors					
Drug	1. Marijuana (weakest association)	2. Non-injected crack cocaine (usually snorted)	3. Non-injected heroin	4. Crack (usually smoked)	5. Any injectable drug (strongest association)

Note: 1 indicates the weakest association with risky sexual behaviors, and 5 indicates strongest association with risky sexual behaviors (Flom et al., 2001).

Drug intervention programs that prevent and treat drug abuse are likely to reduce risky sexual behaviors (Flom et al., 2001). Additionally, interventions among drug users to reduce harm encourage condom use and help drug users to become more risk averse, both in their general lives and their sex and drug behaviors (Flom et al., 2001).

Medical Marijuana

Marijuana is considered a Schedule I federally controlled substance and Federal law deems it illegal in the United States (McKenna, 2014). However, marijuana is legally available by prescription in 23 states for medicinal purposes (Appendix A). Medical marijuana use is a controversial issue in medicine, and, given its lack of legal status until recently, little research exists to settle the debate between supporters and critics of medical marijuana use (McKenna,

2014). However, there is recent, emerging literature on medical marijuana use in people living with HIV, as it has been found useful in appetite stimulation and weight gain for those who experience weight loss while on therapy.

Medicinal marijuana has been shown to help relieve stress, stimulate appetite, assist in adherence to medical treatments, and relieve nausea associated with antiretroviral medications (Bruce et al., 2013). Therefore, many HIV-positive individuals use marijuana to alleviate medication side-effects and disease symptoms (Bruce et al., 2013). For example, sensory neuropathy is the most common nerve disorder associated with HIV and has been described as an “aching, painful numbness, or burning” sensation (Abrams et al., 2007, p. 515). Researchers have discovered that marijuana aids in reducing pain associated with this condition (Gonzalez, Schuster, Vassileva, & Martin, 2011). HIV-positive MSM report a negative self-image and symptoms of depression once receiving their diagnosis (Bruce et al., 2013), and marijuana aids in coping with the prospect of living with a chronic, incurable illness (Bruce et al., 2013).

However, marijuana has addictive properties and other concerns when considering its use as a medicine. It is mind-altering and has an impact on the addiction circuitry of the brain and produces withdrawal symptoms similar to alcohol and benzodiazepines (McKenna, 2014). Marijuana dependence negatively affects learning, memory, and complex motor skills (Gonzalez et al., 2011). It will be interesting to watch the coming decades unfold and see the relationship between research and the political landscape of marijuana and the treatment of HIV evolve.

Methods

Research Question

The purpose of this research project was to analyze de-identified data detailing HIV test results for 898 non-Hispanic adult males tested by Columbus Public Health between February

2013 and April 2013. This project examined a hypothesized association between marijuana use and HIV infection, comorbidity of HIV and other STDs, and potentially confounding variables. The descriptive analysis included variables representing past or current drug and alcohol use and past-year condom use, previous STDs, the number of sexual partners, and partner drug and alcohol use. Descriptive statistics were generated by age group, gender, race, and sexual orientation. This hypothesis-driven project was conducted to provide deeper insight into the sample associations and characteristics, especially among MSM and marijuana users. It is hoped that this research will lead to improvements in targeted testing by identifying Columbus populations most at-risk for HIV by understanding behavioral associations.

Sample

The data used in this study were collected under informed consent by Columbus (Ohio) Public Health (CPH) from February 2013 to April 2013. All individuals tested during this period were included in the original dataset, comprised of 1710 individuals who were tested voluntarily with a rapid, oral HIV test using the OraQuick ADVANCE® Rapid HIV-1/2 Antibody Test (OraSource Technologies in Bethlehem, Pennsylvania, USA). Each client completed a standardized sexual behavior questionnaire (Appendix B). Each client was asked about drug use by a CPH employee. The client was asked to identify which, if any, illicit substances he or she had ever used.

A positive test result with the OraQuick ADVANCE® Rapid HIV-1/2 Antibody Test is known as a *preliminary positive* HIV result. If a client had a preliminary positive test result for HIV with the initial rapid test, CPH protocol required voluntary collection of a blood sample for confirmatory Western Blot performed by the Ohio Department of Health. The data therefore

included individuals with confirmed HIV positive serostatus. All clients with a preliminary positive result consented to confirmatory testing.

Ethical approval. For the purpose of this project, CPH provided de-identified data for analysis. The project was deemed exempt by the Wright State University Institutional Review Board (IRB) (Appendix C).

Sample reduction and grouping variables. Data were collected by CPH from individuals receiving an HIV test either at the clinic at CPH or at testing outreach done in the surrounding community. All participants signed informed consent paperwork at the time of testing.

Individuals with an undocumented (CPH employee did not record the result) or inconclusive HIV test result were removed from the dataset. Due to small sample sizes and concerns of sample bias, males who reported a race of Asian, Native Hawaiian or Pacific Islander, Native American or Alaskan Native, males who did not report a race, and males who reported to be more than one race were also removed. Because ethnicity (Hispanic/Latino or non-Hispanic/Latino) introduced the same concerns, males reporting Hispanic/Latino ethnicity were also removed from the dataset.

Because this project focused on MSM status, males were categorized based on sexual orientation (heterosexual or MSM). A male was categorized as MSM if he self-reported a sexual orientation of homosexuality or bisexuality.

Because this project was concerned with testing a potential association between marijuana use and HIV risk, the only illicit substance of interest was marijuana. Individuals in the dataset were categorized as either a marijuana user or a non-user based on past or current use.

Males who claimed to use heroin were removed from the sample, as that is an additional, direct risk factor for HIV due to unsafe needle practices and blood exposure.

Upon initial data collection done by CPH, each individual was asked to identify all sexually transmitted diseases ever contracted based on a list of common STDs. This STD list included bacterial vaginosis, trichomoniasis, Chlamydia (nongonococcal urethritis), Hepatitis C, genital warts, gonorrhea, herpes, HPV, Hepatitis B, HIV, syphilis, or other. The number of STDs per person was counted to determine the mean number of STDs.

The final data set for analysis was comprised of 898 non-Hispanic/Latino adult males. All were White ($n=294$) or Black/African American ($n=604$) and aged 18 years and older, self-identified as MSM or not MSM, as a marijuana user or not a marijuana user, and had a valid, confirmed HIV test result.

Statistical Analysis

Descriptive statistics were generated to calculate frequencies and means. The dependent variables of interest were the mean number of sexually transmitted diseases (STD), the mean number of current sexual partners, and the mean number of risk factors. Independent variables for this project included MSM status (MSM, Not MSM), race (White or Black/African American), and marijuana use (User, Non-user). Means across three or more groups were compared through Analysis of Variance (ANOVA) using general linear models: all models were adjusted for age. IBM SPSS software (Version 22.0) was used for all analyses. A series of three ANOVA models for main effects were run for each of three dependent variables representing number of lifetime STDs, number of current sexual partners (past 12 months), and number of current STD risk factors. The content of each model series is shown in Table 2.

Table 2

Analysis of Variance (ANOVA) Models used in Analysis

Model Series	Class Variable	Grouping Variable	Dependent Variables	Covariate	Compared
1	Marijuana use (user, non-user)	Race (White, Black/African American)	<ul style="list-style-type: none"> • Lifetime number of STDs • Number of current sexual partners • Number of sexual risk factors 	Age	Marijuana users vs. non-users
2	MSM Status (MSM, Not MSM)	Marijuana use (user, non-user)	<ul style="list-style-type: none"> • Lifetime number of STDs • Number of current sexual partners • Number of sexual risk factors 	Age	<p>Marijuana users who are MSM vs. Marijuana users who are Not MSM; and</p> <p>Marijuana Non-Users who are MSM vs. Marijuana Non-users who are Not MSM</p>
3	MSM Status (MSM, Not MSM)	Race (White, Black/African American)	<ul style="list-style-type: none"> • Lifetime number of STDs • Number of current sexual partners • Number of sexual risk factors 	Age	<p>White men who are MSM vs. White men who are Not MSM; and</p> <p>Black men who are MSM vs. Black men who are Not MSM</p>

Graphical Illustration of Relationships.

Nine graphs were generated from the ANOVA results to illustrate the relationship among variables. When slopes suggested different relationships among variables, post-hoc-tests were performed to determine potential significance of differences between means across groups. The level of significance was pre-determined to be $\alpha < 0.05$.

Results

Descriptive Statistics

The final sample size consisted of 898 males. There were 294 White males (32.7%) and 604 (67.3%) Black/African-American males. The overall mean age was 32 years and ranged from 18 years to 74 years. The mean age for White males was 34 years with a range of 18 years

to 71 years, slightly higher than the mean age for Black/African-American males (31 years with a range of 18 years to 74 years) (see Table 3).

Table 3

Descriptive Statistics and Frequencies for White and Black/African-American Males Tested for HIV

	White (n=294)	Black/African American (n=604)	Overall (N=898)
Mean Age (years)	34.11 ±12.65	31.30 ± 10.51	32.33 ± 11.32
# MSM (66%)	107	56	163
# Marijuana Users (34%)	53	198	251

There were 163 (18.2%) MSM overall. Although more Black/African-American males ($n=56$) were tested for HIV than White males, more White males ($n=107$) were considered MSM than Black/African-American males (Table 3). White MSM accounted for 11.9% of the entire sample, 36.4% of White males tested, and 65.6% of MSM. Black/African-American MSM accounted for 6.2% of the entire sample, 9.3% of Black/African-American males tested for HIV, and 34.4% of MSM.

Marijuana users accounted for 28% (251 individuals) of the entire sample. Fifty-three White males (18% of White males, 21.1% of marijuana users) reported using marijuana, and 198 Black/African-American males (32.8% of Black/African-American males, 78.9% of marijuana users) reported using marijuana (Table 3). More Black/African-American males reported marijuana use (78.9%) than White males (18%).

In terms of the number of current sexual partners, the overall mean for the entire sample was 2.08 with a standard deviation of 2.03, with a minimum of 0 partners, and a maximum of 20 partners. For White males, the mean was slightly lower (1.86 with a standard deviation 2.04 and

a range of 0 to 20 partners) than that for Black/African-American males (mean 2.18, standard deviation 2.02, range of 0-20 partners) (Figure 2).

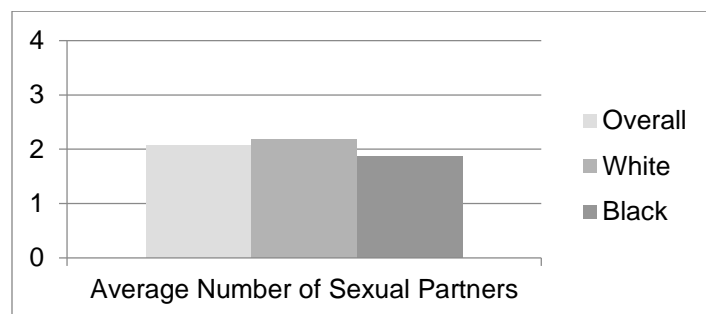


Figure 2. Average number of current sex partners for White and Black/African-American males tested for HIV.

The mean number of sexually transmitted diseases for the full sample was 0.78 with a standard deviation of 0.939, and a range of zero to four (0-4). For White males, the mean number of sexually transmitted diseases was 0.48 with a standard deviation of 0.75 and a range of zero to four, lower than the mean number of sexually transmitted diseases for Black/African-American males (0.92, standard deviation 0.99, range 0-4) (Figure 3).

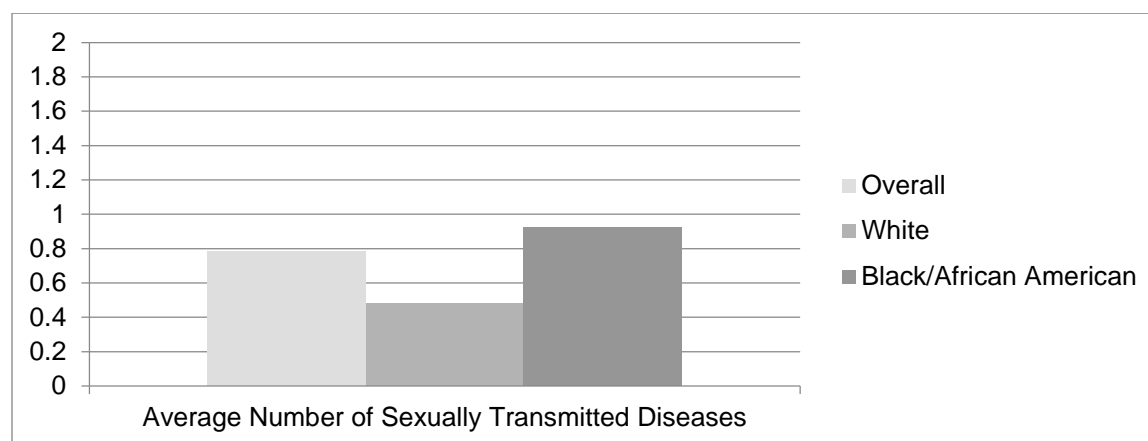


Figure 3. Average number of sexually transmitted diseases for White and Black/African-American males tested for HIV.

Columbus Public Health enumerated risk factors for each person tested for HIV. The overall mean number of risk factors was 1.75 with a standard deviation of 0.88 and a range of zero to three. White males had a slightly lower mean of 1.67 risk factors with a standard deviation of 0.91 and a range of zero to three, compared with Black/African-American males, who had a mean of 1.78 risk factors with a standard deviation of 0.87 and a range of zero to three (0-3) risk factors (*Figure 4*).

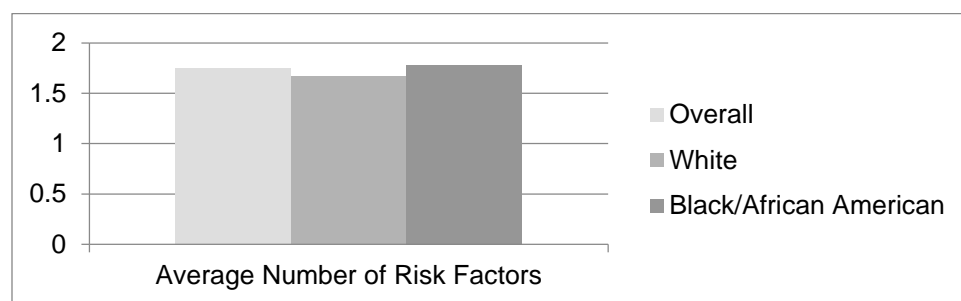


Figure 4. Average number of risk factors for White and Black/African-American males tested for HIV.

Models Series 1: Evaluating Marijuana Use and Race Effects

STD history by marijuana use and race. The mean number of STDs of White marijuana users and non-users was compared to the mean number of STDs of Black/African-American marijuana users and non-users (*Figure 5*). The probability was calculated to be $p < 0.637$, which indicated that the difference in means was not significant. The graph showed a similar slope for differences in mean STD numbers between marijuana use categories for both races.

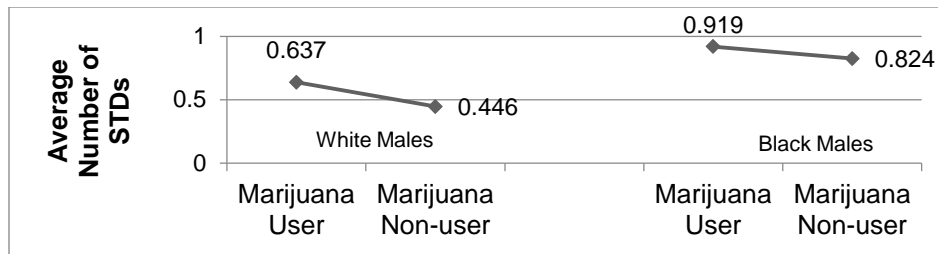


Figure 5. Average number of STDs among White and Black/African American marijuana users and non-users. The ANOVA model was not statistically significant.

Number of current sexual partners by marijuana use and race. The mean number of current sex partners of White marijuana users and non-users was compared to the mean number of Black/African American marijuana users and non-users (Figure 6). The probability was calculated to be $p < 0.050$, which indicated marginal ANOVA model significance. The graph of mean number of sex partners across marijuana use groups showed a different slope between White and Black/African American groups. A t-test was performed on the subsample of Black/African Americans and compared the mean number of current sex partners of marijuana users to the mean number of current sex partners of marijuana non-users. The probability was calculated to be $p < 0.268$, which confirmed the difference in means was not significant.

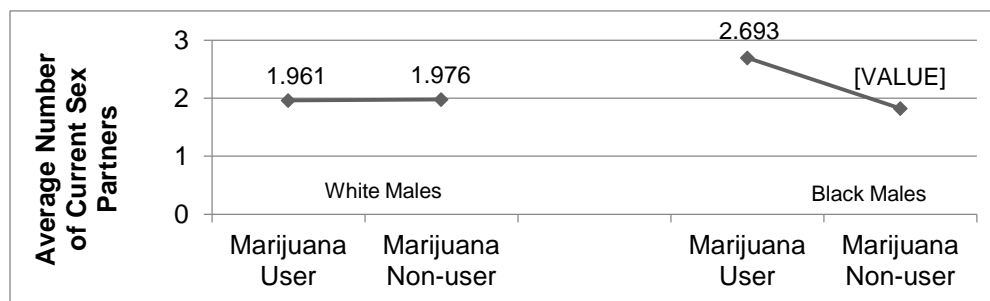


Figure 6. Average number of current sexual partners among White and Black/African American marijuana users and non-users. The ANOVA model was marginally significant ($p = 0.050$); a post-

hoc t-test comparing Black/African American sex partner number means by marijuana use group was nonsignificant ($p=0.268$).

Risk factors by marijuana use and race. The mean number of risk factors for White marijuana users and non-users were compared to the mean number of risk factors of Black/African American marijuana users and non-users (Figure 7). The probability was calculated to be $p<0.166$, which indicated the difference in risk factor number means was not significant. The graph showed a similar slope for the differences in mean risk factor number between marijuana use groups for both races.

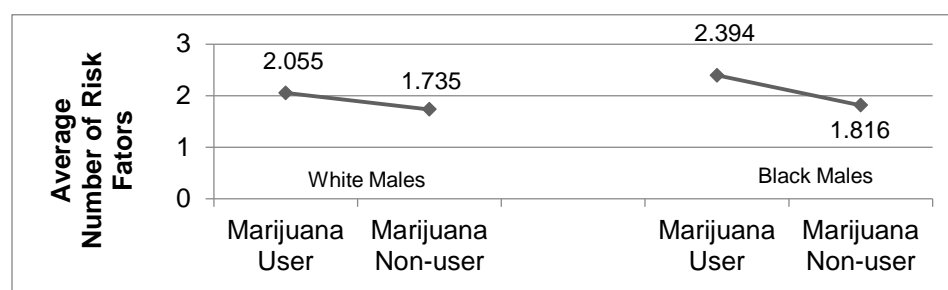


Figure 7. Average number of risk factors among White and Black/African American marijuana users and non-users. The ANOVA model was not statistically significant.

Model Series 2: Evaluating Marijuana Use and MSM Status Effects

STD history by marijuana use and MSM status. The mean number of lifetime STDs for MSM and heterosexual marijuana users was compared to the mean number of STDs for MSM and heterosexual marijuana non-users. The probability was calculated to be $p<0.992$, which indicated that the difference in STD number means was not significant. The graph showed a similar slope between MSM and non-MSM, indicating similar mean STD values for MSM and heterosexual men within marijuana use group (Figure 8). Mean numbers of lifetime STDs were lower for marijuana non-users compared to users, but no significance testing was conducted for that difference in this model.

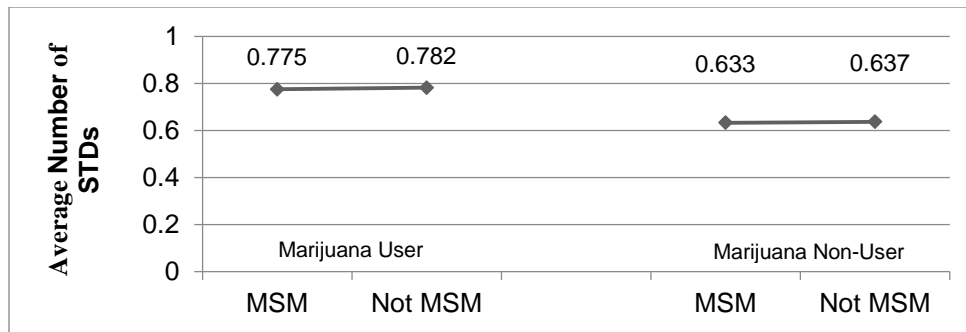


Figure 8. Average number of STDs among MSM and heterosexual marijuana users and non-users. The ANOVA model was not statistically significant.

Number of current sexual partners by marijuana use and MSM status. The mean number of current sexual partners for MSM and heterosexual marijuana users was compared to MSM and heterosexual marijuana non-users. The probability was calculated to be $p < 0.347$, indicating no significant differences across groups. The graph showed different slopes by marijuana use group, illustrating a greater difference in mean number of sex partners due to MSM status for marijuana users than non-users (Figure 9). A post-hoc t-test was performed on the subset of marijuana users, comparing the mean number of current sexual partners for MSM to the mean number of current sexual partners for heterosexual males. The probability of the t-test was calculated to be $p < 0.113$, which confirmed that the difference in means for the MSM and heterosexual groups was not significant.

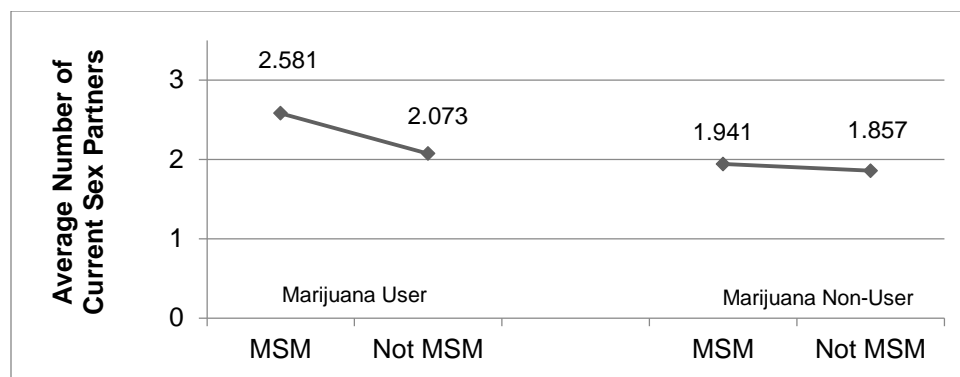


Figure 9. Average number of current sexual partners among MSM and heterosexual marijuana users and non-users. The ANOVA model was not statistically significant.

Number of risk factors by marijuana use and MSM status. The mean number of risk factors for MSM and heterosexual marijuana users was compared to the mean number of risk factors for MSM and heterosexual marijuana non-users (Figure 10). The probability was calculated to be $p < 0.004$, which indicated that the difference in means for number of risk factors was strongly significant between MSM and non-MSM groups. The graph showed a similar slope between marijuana users and non-users, with the MSM groups showing significantly greater mean number of risk factors than non-MSM for both marijuana use groups.

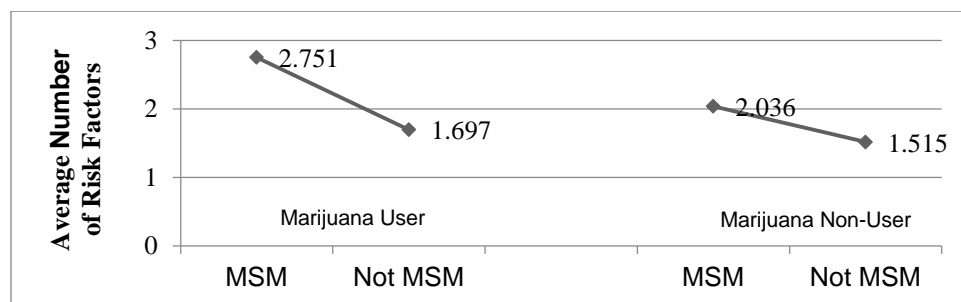


Figure 10. Average number of risk factors among MSM and heterosexual marijuana users and non-users. The ANOVA model was significant ($p < 0.004$).

Model Series 3: Evaluating Race and MSM Status Effects

Number of STDs by race and MSM status. The mean number of STDs of MSM and heterosexual White males were compared to the mean number of STDs of MSM and heterosexual Black/African-American males. The probability was calculated to be $p < 0.051$, which indicated marginal significance. The graphs showed opposite slopes between races (Figure 11), with more mean lifetime STDs reported by MSM among Whites and fewer mean lifetime STDs reported by MSM among Blacks/African Americans.

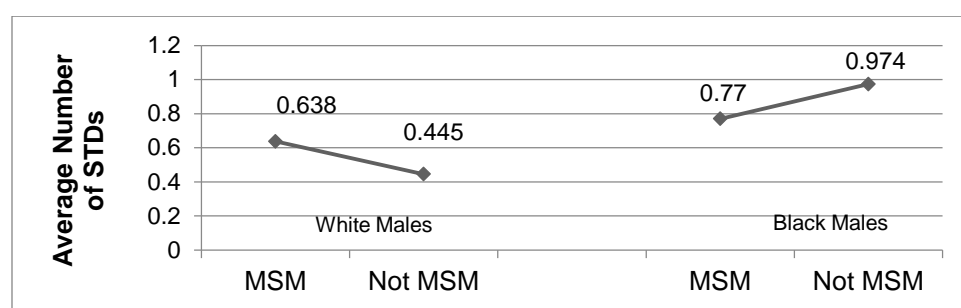


Figure 11. Average number of STDs among White and Black/African-American MSM and heterosexual males. The ANOVA model was marginally significant ($p < 0.051$).

Number of current sexual partners by race and MSM status. The mean number of current sexual partners for MSM and heterosexual White males were compared to the mean number of current sexual partners of MSM and heterosexual Black/African-American males (Figure 12). The probability was calculated to be $p < 0.375$, which indicated that the difference in means was not significant. The graph showed different slopes, indicating greater differences between the mean number of sex partners for MSM vs. non-MSM among Whites. A t-test was performed on the subsample of White males, comparing the mean number of current sexual partners of MSM to the mean number of current sexual partners to heterosexual males. The t-test probability was calculated to be $p < 0.0001$, which indicated the difference in means was strongly

significant: when not age-adjusted, White MSM in this sample reported significantly greater numbers of current sexual partners than White non-MSM.

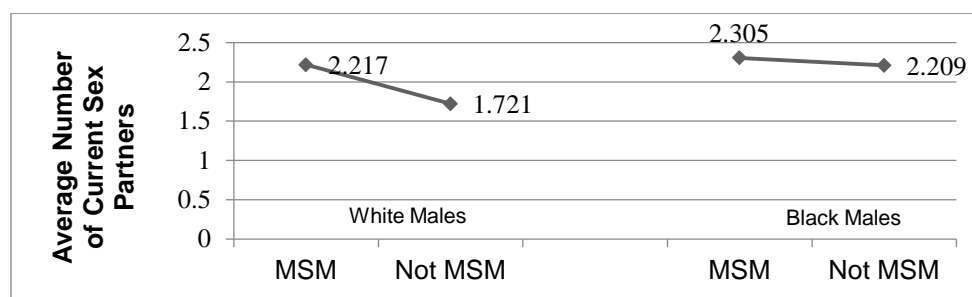


Figure 12. Average number of current sexual partners among White and Black/African-American MSM and heterosexual males. The ANOVA was not significant; a post-hoc t-test for White MSM vs. not MSM was highly significant ($p < 0.0001$).

Number of risk factors by race and MSM status. The mean number of risk factors for MSM and heterosexual White males were compared to the mean number of risk factors for MSM and heterosexual Black/African-American males (Figure 13). The probability was calculated to be $p < 0.10$, which indicated that the difference in means was not significant. The graph showed similar slopes between races, with MSM reporting a greater number of STD risk factors than their heterosexual counterparts for both racial groups.

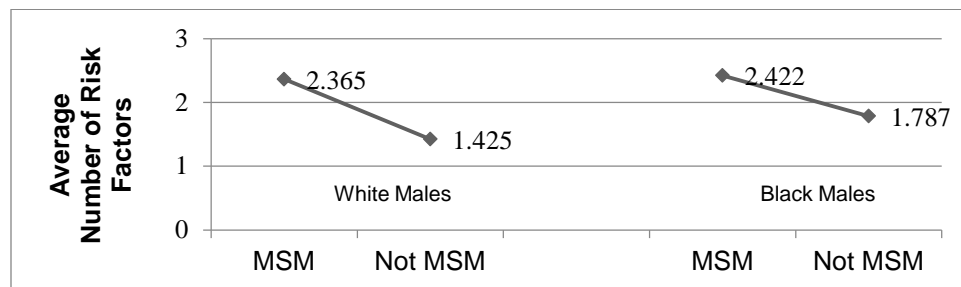


Figure 13. Average number of risk factors among White and Black/African-American MSM and heterosexual males.

HIV Test Results and Sample Characteristics

With regard to HIV test results, 14 males received a *preliminary positive* result. White males accounted for eight of these results, and Black/African-American males accounted for six of these results. After the Western Blot blood test was performed, 11 were confirmed to be positive and three were not confirmed.

Descriptive statistics were performed for this subpopulation of 11 males. The overall mean was 28.91 years with a standard deviation of 10.10 and a range of 21 to 50 years. Their overall mean number of sexual partners was 2.36 with a standard deviation of 2.063 and a range of zero to six (0 to 6) partners. The overall mean number of lifetime STDs was 0.55 with a standard deviation of 0.934 and a range of zero to three (0-3). Finally, the overall mean number of risk factors was calculated to be 2.82 with a standard deviation of 0.603 and a range of one to three (1 to 3). There were 10 MSM in the population and five marijuana users (see Table 4 and Table 5).

Table 4

Frequencies of White and Black/African American Males with a Confirmed Positive HIV Test

	White (n=6)	Black/African American (n=5)	Overall (N=11)
Number of Heterosexual Males	0	1	1
Number of MSM	6	4	10
Number of Marijuana Users	1	4	5
Number reporting as both MSM and Marijuana User	1	3	4

Table 5

Mean Characteristics for White and Black/African American Males with a Confirmed Positive HIV Test

	White (n=6)	Black/African American (n=5)	Overall (N=11)
Mean Age (years \pm standard deviation)	33 \pm 12.538	24 \pm 1.871	28.91 \pm 10.100
Mean Number of Current Sexual Partners	2.33 \pm 2.066	2.4 \pm 2.302	2.36 \pm 2.063
Mean Number of STDs	0.33 \pm 0.516	0.8 \pm 1.304	0.55 \pm 0.934
Mean Number of Risk Factors	2.67 \pm 0.816	3 \pm 0.000	2.82 \pm 0.603

Discussion

Based on demographic results of the entire sample of males, more Black/African-American males were tested for HIV during the testing period. Perhaps education about HIV is reaching this population, and has encouraged Black/African-American males in the community to be tested for HIV.

More White MSM were tested for HIV than Black/African-American MSM at a rate of almost 2:1. Some Black/African-American males may not have admitted to being homosexual or bisexual, or having had sex with another man in the last 12 months.

When looking at marijuana use, 28% of all individuals tested for HIV admitted to using marijuana. More Black/African-American males admitted to using marijuana than White males at a rate of 4:1. This was an expected result, based on literature. White males may not admit to using marijuana for fear of legal consequences, although all information collected at time of testing is strictly used for research and demographic purposes.

Black/African-American males had a similar mean number of current sexual partners as White males and a similar mean number of sexual risk factors. Given these results, it was

unexpected to find that the Black males reported almost twice as many lifetime STDs when compared to White males. It is possible that the Black/African-American males were much more sexually active, and acquired more STDs prior to the 12 months before being tested.

Heterosexuals and MSM, both white and Black/African American, who do not use marijuana, showed no significant difference in the mean number of current sexual partners. Based on the literature, this was an unexpected result. Generally, MSM have more current sexual partners than heterosexuals (CDC, 2014g).

When MSM and heterosexual marijuana users were compared to their non-using counterparts, non-users had fewer mean lifetime STDs. This result is consistent with current literature. Marijuana users generally have a greater mean number of lifetime STDs (Brodbeck et al., 2006).

Black/African-American males had a greater mean number of current sexual partners when compared to White males in both marijuana use groups: the same was true with regard to mean number of risk factors. As expected from the literature, marijuana users had greater mean number of risk factors than non-users, regardless of MSM status.

Limitations

There were several limitations associated with this project. The representation of Black/African-American MSM is probably lower than the actual proportion of this group in the Columbus, OH area. There is likely under reporting of MSM status by Black men. In the United States, Black/African-American males are fearful of additional stigmatization and homophobia from family, friends, and religious and the larger community (Balaji, Oster, Viall, Heffelfinger, Mena, & Toledo, 2012). These men will therefore deny being MSM in order to 'save face' within the community.

Another limitation is centered around marijuana use. Under-reporting of marijuana use is a common occurrence (Frendrich, Johnson, Wislar, Hubbell, & Spiehler, 2004).

Conclusions

Based on the literature available and the results of this study, race, MSM status, and marijuana use all play a role in the risk for contracting HIV. In this study, Black/African-American males had more lifetime STDs than White males, regardless of marijuana use and MSM status. They also had more current sexual partners and risk factors than White males. This puts Black/African American males at a greater risk for HIV infection.

Based on statistical analyses of this project, MSM have more risk factors than heterosexual males regardless of marijuana use. Additionally, MSM have more current sexual partners and risk factors on average regardless of race. It is interesting to note that heterosexual Black/African-American males have more STDs on average than MSM Black/African Americans, but have fewer current sexual partners.

Finally, marijuana use plays a part in the risk for contracting HIV. Marijuana users have more risk factors than non-users, regardless of race. They have more lifetime STDs than non-users, regardless of MSM status, and more current sexual partners than non-users, regardless of MSM status. Furthermore, MSM marijuana users have more sex partners than MSM non-users, and Black/African American marijuana users also have more current sexual partners on average than Black/African American non-users. It is necessary to educate the younger population on the risks associated with marijuana use, safer sex practices, and the importance of being tested for STDs on a regular basis to reduce the risk of HIV.

A statistical test for the attributable variance for HIV risk for Black/African-American males who are also MSM and also use marijuana was not completed for this project. It would be

useful to conduct such an analysis and quantify the attributable risk for each factor. Based on the results of this project, members of this population would be the most at-risk group of individuals in this sample and most in need of evidence-based information about their risk and ways to protect their health.

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Appendix A - Legal Medical Marijuana States

Legal Medical Marijuana States and DC

Alaska	Washington, DC	Maryland	Nebraska	Oregon
Arizona	Delaware	Massachusetts	New Hampshire	Rhode Island
California	Hawaii	Michigan	New Jersey	Vermont
Colorado	Illinois	Minnesota	New Mexico	Washington
Connecticut	Maine	Montana	New York	

Retrieved from <http://medicalmarijuana.procon.org/view.resource.php?resourceID=000881>

HIV INTERVENTION SEXUAL HEALTH ASSESSMENT

Pretest Counselor: _____ **Test(s) Required:** ☐ G/Chl ☐ HCV ☐ HIV ☐ SYP

Gender: ☐ Male ☐ Female ☐ Transgender M-F ☐ Transgender F-M

Race: ☐ Caucasian ☐ American Indian or Alaskan Native ☐ African American
☐ Asian ☐ Native Hawaiian or Pacific Islander ☐ Other: _____

Hispanic/Latino: ☐ Yes ☐ No **Date of Birth:** ____/____/____ **Age:** ____

City: _____ **County:** _____ **State:** _____ **Zip:** _____

Have you ever been treated for any of the following?

<input type="checkbox"/> Bacterial Vaginosis	<input type="checkbox"/> Chlamydia	<input type="checkbox"/> Genital Warts	<input type="checkbox"/> Herpes	<input type="checkbox"/> Hepatitis B	<input type="checkbox"/> HIV	<input type="checkbox"/>
Syphilis						
<input type="checkbox"/> Trichomoniasis	<input type="checkbox"/> Hepatitis C	<input type="checkbox"/> Gonorrhea	<input type="checkbox"/> HPV	<input type="checkbox"/> NGU/NSU	<input type="checkbox"/> Other:	

Have you ever been tested for HIV? ☐ Yes ☐ No ☐ Not sure **Date of Last Test:** ____/____/____

Result: ☐ Positive ☐ Negative ☐ Preliminary Positive ☐ Indeterminate ☐ I Don't Know

Have you ever received blood transfusion, blood product, or whole organ transplant? ☐ Yes ☐ No

Date: / /

Would you have taken the HIV test if your name was required? ☐ Yes ☐ No

Number of sex partners in last 12 months (circle one):

1 2 3 4 5 6 7 8 9 10 11 12 >12

Date of last sexual encounter: ____ / ____ / ____

[illegible]


Appendix C - Wright State University IRB Exempt Status



Office of Research and Sponsored Programs
201J University Hall
3640 Col. Glenn Hwy.
Dayton, OH 45435-0001
(937) 775-2425
(937) 775-3781 (FAX)
e-mail: rsp@wright.edu

DATE: May 2, 2014

TO: Andrea M. Hager, PI, Student
Community Health
Nikki L. Rogers, Ph.D., Faculty Advisor

FROM: B. Laurel Elder, Chair 
WSU Institutional Review Board

SUBJECT: SC# 5526
'Identification of Confounding Variables Among Males Age 20-24 Years Diagnosed with HIV in Columbus, OH'

At the recommendation of the IRB Chair, your study referenced above has been determined to meet Federal exemption criteria 45 CFR 46.101(b). **Please note that any change in the protocol must be reviewed by the IRB, as the project may no longer be exempt.**

This action will be reported to the Full Board at their next scheduled meeting.

If you have any questions or require additional information, please call Jodi Blackledge, Program Facilitator at 775-3974.

Thank you!

Enclosure

RESEARCH INVOLVING HUMAN SUBJECTS

SC# 5526

ACTION OF THE WRIGHT STATE UNIVERSITY
EXEMPT DETERMINATION
Assurance Number: FWA00002427

Title: 'Identification of Confounding Variables Among Males Age 20-24 Years Diagnosed with HIV in Columbus, OH'

Principal Investigator: Andrea M. Hager, PI, Student
Community Health
Nikki L. Rogers, Ph.D., Faculty Advisor

The Institutional Review Board Chair has determined that your project is exempt from IRB oversight per 45 CFR 46.101(b) 4.

B. Laurel Elder Ph.D.
Signed _____ Chair, WSU-IRB
Approval Date: May 02, 2014
IRB Mtg. Date: May 19, 2014

Appendix D - Columbus Public Health Letter of Permission



March 12, 2014

Andrea Hager
Wright State University
MPH Candidate

Dear Ms. Hager,

Columbus Public Health supports you, a Wright State University Master's in Public Health student, in your Culminating Experience. Specifically, Columbus Public Health permits you to use de-identified data from the Sexual Health programs from February, March and April 2013, which detailed HIV testing information including demographic and risk factor variables. The analysis shall include age groups, gender, race, sexual orientation, drug and alcohol use, condom use, previous STIs, the number of sexual partners, and partner drug and alcohol use.

The mission of Columbus Public Health is to protect health and improve lives for residents. Accomplishing this mission requires assuring a competent work force. Thus, Columbus Public Health is pleased to partner with Wright State University. If you have any questions about our partnership or this research project, please contact me at 614-645-6790 or asregan@columbus.gov

Sincerely,

Audrey S. Regan, PhD
Director, Sexual Health Promotion

HEALTH COMMISSIONER | Teresa C. Long, MD, MPH
BOARD OF HEALTH PRESIDENT, EX-OFFICIO:
Mayor Michael B. Coleman



BOARD OF HEALTH | John H. Bortz, MA
Karen J. Morrison, JD, MS | Augustus G. Parker III, MD
Martin S. Seltzer, JD, PhD | Mary Ellen Wewers, PhD, MPH, RN

240 Parsons Avenue | Columbus, OH 43215 | T (614) 645-7417 | F (614) 645-7633 | health@columbus.gov | www.publichealth.columbus.gov

Appendix E – List of Competencies Met in CE

Tier 1 Public Health Competencies

Domain #1: Analytic/Assessment
Identify the health status of populations and their related determinants of health and illness (e.g., factors contributing to health promotion and disease prevention, the quality, availability and use of health services)
Describe the characteristics of a population-based health problem (e.g., equity, social determinants, environment)
Use variables that measure public health conditions
Identify sources of public health data and information
Recognize the integrity and comparability of data
Identify gaps in data sources
Adhere to ethical principles in the collection, maintenance, use, and dissemination of data and information
Describe the public health applications of quantitative and qualitative data
Use information technology to collect, store, and retrieve data
Domain #2: Policy Development and Program Planning
Gather information relevant to specific public health policy issues
Domain #3: Communication
Communicate in writing and orally, in person, and through electronic means, with linguistic and cultural proficiency
Participate in the development of demographic, statistical, programmatic and scientific presentations
Domain #4: Cultural Competency
Recognize the role of cultural, social, and behavioral factors in the accessibility, availability, acceptability and delivery of public health services
Respond to diverse needs that are the result of cultural differences
Domain #5: Community Dimensions of Practice
Recognize community linkages and relationships among multiple factors (or determinants) affecting health (e.g., The Socio-Ecological Model)
Describe the role of governmental and non-governmental organizations in the delivery of community health services
Domain #6: Public Health Sciences
Describe the scientific evidence related to a public health issue, concern, or, intervention
Retrieve scientific evidence from a variety of text and electronic sources
Discuss the limitations of research findings (e.g., limitations of data sources, importance of observations and interrelationships)
Partner with other public health professionals in building the scientific base of public health
Domain #7: Financial Planning and Management
Adhere to the organization's policies and procedures
Report program performance
Domain #8: Leadership and Systems Thinking
Incorporate ethical standards of practice as the basis of all interactions with organizations, communities, and individuals
Use individual, team and organizational learning opportunities for personal and professional development
Participate in mentoring and peer review or coaching opportunities

Concentration Specific Competencies

Public Health Management
Have a knowledge of strategy and management principles related to public health and health care settings
Know effective communication strategies used by health service organizations
Have an understanding of organizational theory and how it can be utilized to enhance organizational effectiveness
Have a knowledge of successful program implementation principles
Be capable of applying decision-making processes
Have a knowledge of human resource principles to enhance organizational management, motivate personnel and resolve conflict
Have an understanding of effective mentoring methods
Be able to determine how public health challenges can be addressed by applying strategic principles and management-based solutions
A knowledge of ethical principles relative to data collection, usage, and reporting results
An awareness of ethical standards related to management
A knowledge of ethical standards for program development